Table 1

	Patients ($n=64$)	Controls ($n=64$)	P
Age (years)	33.1 ± 10.9	35.0 ± 12.3	0.34
Women, *n* (%)	34 (53)	32 (50)	0.72
Body surface (m^2)	1.7 ± 0.1	1.7 ± 0.1	0.73
Left ventricular end diastolic volume index (mL/m^2)	64.7 ± 15.2	53.3 ± 10.9	< 0.0001
Left ventricular ejection fraction (%)	60.2 ± 5.0	62.6 ± 4.4	0.005
Cardiac index ($L/min/m^2$)	3.0 ± 0.5	2.8 ± 0.5	0.07
Mitral E to Ea ratio	5.2 ± 1.3	4.7 ± 1.3	0.03
Mitral E to Ea ratio ≤ 8, *n* (%)	61 (95)	61 (95)	
Mitral E to Ea ratio ≤ 15, *n* (%)	3 (5)	3(5)	
Mitral E to Ea ratio > 15, *n* (%)	0	0	
Tricuspid regurgitation peak velocity (m/s)	2.3 ± 0.2 ($n=59$)	2.2 ± 0.2 ($n=61$)	0.33
Tricuspid regurgitation peak velocity > 2.5 m/s, *n* (%)	5 (8)	6 (10)	0.79

http://dx.doi.org/10.1016/j.acvd.2013.03.034

32

Assessment of right ventricular function at rest and during exercise by echocardiography in patients with pulmonary hypertension

P.-A. Metzdorf, O. Huttin, D. Voilliot, R. Elisabeth, J. Schwartz, J.-M. Sellal, Y. Juilliere, F. Chabot, A. Chaouat, C. Selton-Suty
CHU de Nancy, Nancy, France

Background.— Standard echocardiography and 2D speckle tracking imaging method (2DSTI) allow a functional and morphologic non-invasive evaluation of the right ventricle (RV). The aim of this study is to evaluate RV function during stress testing in patients with pre-capillary pulmonary hypertension (PHT).
Methods.— Fifteen patients with pre-capillary PHT (13 PAH, two thromboembolic PHT) had right heart catheterization with measurements of right atrial pressure (RAP), pulmonary artery pressures, cardiac index and calculation of pulmonary vascular resistance (PVR) at rest and during exercise. They also underwent a stress echocardiography with an ergo-cyclometer within 48 hours from RV catheterization. The following RV function parameters were measured during echocardiography: RV fractional area change (RVFAC), tricuspid annular plane systolic excursion (TAPSE), Tissue Doppler maximal systolic velocity of the tricuspid annulus (Sm), tricuspid regurgitation (TR) velocity, and mean strain values by 2DSTI from the lateral (4C view) and inferior (2C view) RV walls. Inferolateral strain was calculated as the mean of the value *f* those six segments. Results of exercise echocardiography were compared to those of 28 normal patients.
Results.— Standard parameters of RV function progressively increased during exercise in normal patients, but lateral, inferior and inferolat strain progressively decreased. In patients with PHT, right heart catheterization showed an increase in PAP and cardiac index during exercise but PVR remained unchanged. During exercise echocardiography, there was no significant variation in any of RV function parameters between rest and exercise. At exercise, inferolat strain significantly correlated with hemodynamic PAP, systolic stroke volume, and RVP (R = 0.61, $P = 0/01$).
Conclusion.— Analysis of RV function during exercise echocardiography is feasible in patients with PHT. Strain values during exercise mirror the changes of PVR, which decrease in normal patients and remain unchanged in patients with PHT, confirming their load dependency. In normal patients, the decrease in longitudinal strain coupled with the increase of other RV function parameters may suggest that longitudinal contraction of RV is not the prominent factor of RV response to exercise. In patients with PHT, the lack of decrease in longitudinal strain probably witnesses a kind of RV contractile reserve that counterbalances the increased afterload during exercise (as shown by elevated PAP and stable RVP).

http://dx.doi.org/10.1016/j.acvd.2013.03.035

33

Early changes in ventricular-arterial coupling in acutely decompensated systolic heart failure (ADSHF): An echocardiography and arterial tonometry study

E. Berthelot[a], O. Masson[b], N. Bihry[b], A. Cohen-Solal[b], P. Assayag[a], D. Logeart[b]
[a] *Hôpital Bicêtre, Le Kremlin Bicêtre, France*
[b] *Hôpital Lariboisière, Paris, France*

Objectives.— Left ventricular (LV) performance is influenced by the coupled arterial and LV properties. Such properties have been poorly investigated during the real setting of acute HF. Our aim is to study the early change in ventricular-arterial coupling in patients with acutely decompensated systolic heart failure (ADSHF).
Patients and methods.— Patients hospitalized for ADSHF were screened. Shock, sustained arrhythmias and reversible HF were excluded. All patients were treated by IV loop diuretics; none received IV vasodilators or inotropes. ACE-I, ARB and betablockers were maintained using previous dose or half-dose. Echocardiography and radial artery tonometry (Sphygmocor, AtCor) were simultaneously performed on admission and were repeated after clinical stabilization (day 4 ± 1). Ejection fraction (EF, Simpson rule), end-systolic volume (ESV), stroke volume (SV) and cardiac output (CO) were measured using echocardiography. From the reconstructed central aortic pressure, end-systolic pressure (Pes) and aortic pulse pressure (PP) were recorded. The SV/PP ratio quantified total arterial compliance and Pes/SV quantified the arterial elastance (Ea). End-systolic left ventricular elastance (Ees) was calculated by using the single-beat method.
Results.— Nineteen male patients (62 ± 14 years) were included. BNP decreased from 1813 ± 1063 to 694 ± 723 pg/mL ($P < 0.01$) and the weight loss was 4 ± 2 kg ($P < 0.01$). The EF increased from 24 ± 7% to 28 ± 7% ($P < 0.02$), SV increased from 23 ± 6 to 27 ± 7 mL/m^2 ($P < 0.01$). ESV, CO and LV stroke work were unchanged (respectively 92 ± 43 to 91 ± 38 mL/m^2, 3.35 ± 0.74 to 3.54 ± 0.73 L/min and 4599 ± 1568 to 4752 ± 1402 mmHg/mL). Pes decreased from 104 ± 17 to 89 ± 15 mmHg ($P < 0.01$) but there was no change in PP (31 ± 11 to 30 ± 12 mmHg). The total arterial compliance increased from 1.53 ± 0.42 to 1.97 ± 0.74 mL/mmHg ($P < 0.01$) and total peripheral resistance decreased from 2306 ± 560 to 1863 ± 644 dynes.s/cm^5 ($P < 0.01$); ($P < 0.01$). There was a 29% decrease in Ea (2.57 ± 0.89 to 1.82 ± 0.52 mmHg/mL, $P < 0.01$). Ees was unchanged (from 1.27 ± 0.41 to 1.15 ± 0.39 mmHg/mL). Consequently, the ratio Ea/Ees decreased from 2.16 ± 0.76 to 1.81 ± 0.44 ($P < 0.02$).
Conclusion.— In ADSHF, early treatment mediated-hemodynamic changes are mainly characterized by a strong decrease in LV afterload, subsequent increase in LV ejection parameters and thus improvement in the ventricular -arterial coupling. In contrast, LV stroke work and contractility are poorly affected. Such an analysis is